

Claims:

I claim:

1. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
 - a. a first sensor having a first sensor output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:
 - i. a first transistor having a first gate
 - ii. a second transistor having a second gate
 - iii. means for applying said first analog input to said first gate and to said second gate
 - c. means for applying said first sensor output as said first analog input.
2. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
 - a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:
 - i. a first transistor having a first gate, said first transistor being an n-type MOS transistor
 - ii. a second transistor having a second gate, said second transistor being a p-type MOS transistor
 - iii. means for applying said first analog input to said first gate and to said second gate
 - c. means for applying said first photodetector output as said first analog input.
3. (cancelled) The machine of claim 2 in which:

- a. said first transistor has a first transistor drain and a first transistor source
 - b. said second transistor has a second transistor drain and a second transistor source
 - c. said first transistor drain and said second transistor source are directly connected.
4. (cancelled) The machine of claim 3 in which:
- a. said first transistor source is directly connected to a first power supply rail
 - b. said second transistor drain is directly connected to a second power supply rail.
5. (cancelled) The machine of claim 4 in which said first power supply rail has a more negative potential than said second power supply rail.
6. (presently amended) ~~The machine of claim 4 in which said first power supply rail has a more positive potential than said second power supply rail.~~ A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
- a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:
 - i. a first transistor having a first gate, said first transistor being an n-type MOS transistor
 - 1. said first transistor having a first transistor drain
 - 2. said first transistor having a first transistor source, said first transistor source being directly connected to a first power supply rail
 - ii. a second transistor having a second gate, said second transistor being a p-type MOS transistor
 - 1. said second transistor having a second transistor drain, said second transistor drain being directly connected to a second

power supply rail, said first power supply rail having a more positive potential than said second power supply rail

2. said second transistor having a second transistor source, said second transistor source being directly connected to said first transistor drain

iii. means for applying said first analog input to said first gate and to said second gate

c. means for applying said first photodetector output as said first analog input.

7. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
- a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:
 - i. a first transistor having a first gate
 - ii. a second transistor having a second gate
 - iii. means for applying said first analog input to said first gate and to said second gate
 - c. means for applying said first photodetector output as said first analog input
 - d. said threshold detector comprising an inverter.
8. (cancelled) The machine of claim 7 in which said inverter comprises said first transistor and said second transistor.
9. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
- a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:

- i. a first transistor having a first gate
 - ii. a second transistor having a second gate
 - iii. means for applying said first analog input to said first gate and to said second gate
 - c. means for applying said first photodetector output as said first analog input
 - d. said threshold detector comprising a digital logic gate.
- 10. (cancelled) The machine of claim 9 in which said digital logic gate comprises said first transistor and said second transistor.
- 11. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
 - a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector being a single-input threshold detector with an implicit threshold level, and said threshold detector comprising:
 - i. a first transistor having a first gate
 - ii. a second transistor having a second gate
 - iii. means for applying said first analog input to said first gate and to said second gate
 - c. means for applying said first photodetector output as said first analog input.
- 12. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
 - a. a first photodetector having a first photodetector output
 - b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:
 - i. a first transistor having a first gate
 - ii. a second transistor having a second gate

iii. means for applying said first analog input to said first gate and to said second gate

c. means for applying said first photodetector output as said first analog input,

in said machine said first transistor and said second transistor being located substantially adjacent to said first photodetector whereby long wires connecting said first photodetector, said first transistor, and said second transistor are not required.

13. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:

a. a first photodetector having a first photodetector output

b. a threshold detector having a first analog input and a first digital output, said threshold detector comprising:

i. a first transistor having a first gate, said first transistor being a minimum-size transistor

ii. a second transistor having a second gate, said second transistor being a minimum-size transistor

iii. means for applying said first analog input to said first gate and to said second gate

c. means for applying said first photodetector output as said first analog input,

whereby the semiconductor chip area occupied by said first transistor and said second transistor is less than would be required for non-minimum-size transistors.

14. (cancelled) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:

a. a multiplicity of threshold detectors, each having:

i. an input line connected to the gates of at least two transistors

ii. a digital output

- b. a multiplicity of photodetectors each having a photodetector output provided as input to the input line of one of said multiplicity of threshold detectors
 - c. means for measuring a multiplicity of elapsed times when said digital outputs of said threshold detectors change states.
- 15. (cancelled) The machine of claim 14 in which said threshold detectors are single-input threshold detectors with implicit thresholds.
- 16. (cancelled) The machine of claim 14 in which said threshold detectors are digital logic gates.
- 17. (cancelled) The machine of claim 14 in which said threshold detectors are inverters.
- 18. (cancelled) The machine of claim 17 in which said inverters consist of minimum-size transistors.
- 19. (previously amended) A machine for time-to-threshold analog-to-digital conversion in a digital imaging system, comprising:
 - a. a first photodetector providing a first photodetector output
 - b. means for initializing said first photodetector output to a first photodetector output level
 - c. a first digital counter providing a digital elapsed time count
 - d. means for detecting when said first photodetector output reaches a first threshold level, comprising:
 - i. a first transistor having a first gate
 - ii. a second transistor having a second gate
 - iii. a digital indicator output signal for indicating when said first photodetector output reaches said first threshold level
 - iv. means for applying said first photodetector output to said first gate

- v. means for applying said first photodetector output to said second gate
- e. means for recording a first value of said digital elapsed time count on the basis of a change in said digital indicator output signal.

20. (previously amended) The machine of claim **19** in which:

- a. said means for detecting when said first photodetector output reaches said first threshold level is an inverter
- b. said digital indicator output signal is the digital output of said inverter.